# Magruder Fertilizer Proficiency Testing

## ANALYTE Summary Statistics

### 260841 (0-45-0)



**Issue Date: 10/31/2026**

| Code | Analyte (Guarantees in green) | [1] Trueness (Lab Value) Robust Mean | n used | Robust Uncert. | Robust StDev | Robust %RSD | [2] Thompson Horwitz %RSD | [2] IA %RSD | [3] Precision (range) Robust Mean | n used |
|---|---|---|---|---|---|---|---|---|---|---|
| 010 | Total N (44%) | 0.252 | 1 | | | | | | 0.012 | 1 |
| 020 | Total P2O5 (%) | **47.37** | **9** | **0.5765** | **1.384** | **2.92** | **1.45** | | **0.4403** | **9** |
| 030 | Citrate Insoluble P2O5 (%) | 0.72 | 2 | | 0.3889 | | | | 0.01 | 2 |
| **040** | **Indirect Available P2O5 (%)** | 47.1 | 2 | | 0.9829 | | | | 0.26 | 2 |
| **041** | **Direct Available P2O5 (%)** | **45.9** | **8** | **0.7283** | **1.648** | **3.59** | **1.48** | **0.93** | **0.5218** | **8** |
| 048 | Water Soluble P2O5 (%) | 44.71 | 2 | | 3.581 | | | | 0.145 | 2 |
| 050 | Soluble K2O (%) | 0.2114 | 1 | | | | | | 0.0011 | 1 |
| 060 | Water (Free) (%) | 2.142 | 2 | | 0.0318 | | | | 0.015 | 2 |
| 101 | Acid Soluble Ca (%) | 17.11 | 4 | 1.976 | 3.162 | 18.5 | 2.42 | | 0.064 | 4 |
| 121 | Acid Soluble Mg (%) | 0.4603 | 4 | 0.1122 | 0.1795 | 39 | 4.5 | | 0.0149 | 4 |
| 148 | Total S (%) | 1.355 | 1 | | | | | | 0.01 | 1 |
| 151 | Acid Soluble As (ppm) | **18.12** | **6** | **1.246** | **2.441** | **13.5** | **10.3** | | 0.65 | 4 |
| 181 | Acid Soluble Cd (ppm) | **20.78** | **7** | **1.141** | **2.414** | **11.6** | **10.1** | | **0.4532** | **6** |

| Code | Analyte (Guarantees in green) | [1] Trueness (Lab Value) Robust Mean | n used | Robust Uncert. | Robust StDev | Robust %RSD | [2] Thompson Horwitz %RSD | [2] IA %RSD | [3] Precision (range) Robust Mean | n used |
|---|---|---|---|---|---|---|---|---|---|---|
| 191 | Acid Soluble Cr (ppm) | **214.5** | **7** | **11.67** | **24.7** | **11.5** | **7.13** | | **3.771** | **6** |
| 202 | Acid Soluble Co (ppm) | 1.844 | 4 | 0.6271 | 1.003 | 54.4 | 14.6 | | | |
| 221 | Acid Soluble Cu (%) | **0.0048** | **6** | **0.0002** | **0.0004** | **8.75** | **8.94** | | 0.0003 | 4 |
| 241 | Acid Soluble Fe (%) | 0.649 | 2 | | 0.15 | | | | 0.0089 | 2 |
| 251 | Acid Soluble Pb (ppm) | 2.86 | 5 | 0.9838 | 1.76 | 61.5 | 13.7 | | 0.0921 | 3 |
| 261 | Acid Soluble Mn (%) | 0.0183 | 1 | | | | | | 0.0002 | 1 |
| 281 | Acid Soluble Hg (ppm) | 0.02 | 1 | | | | | | | |
| 289 | Acid Soluble Mo (ppm) | **6.605** | **6** | **0.4791** | **0.9387** | **14.2** | **12** | | 0.114 | 5 |
| 291 | Acid Soluble Ni (ppm) | 35.48 | 5 | 3.072 | 5.495 | 15.5 | 9.35 | | 0.3461 | 5 |
| 301 | Acid Soluble Se (ppm) | **6.12** | **6** | **2.849** | **5.584** | **91.2** | **12.2** | | **0.5126** | **6** |
| 311 | Sodium (%) | 0.4235 | 2 | | 0.0332 | | | | 0.0132 | 2 |
| 321 | Acid Soluble Zn (%) | **0.0429** | **6** | **0.0026** | **0.0052** | **12.1** | **6.42** | | **0.0006** | **6** |
| 325 | Water Soluble Zn (%) | 0.0366 | 1 | | | | | | 0.0006 | 1 |

**1. Trueness Parameters:** Statistical parameters defining the distribution of lab values which are used to evaluate how close a Lab Value is to the mean. Parameters are shown for number of observations used (n used). Analyte All Tests report identifies data not used. Robust statistics was employed to determine mean and standard deviation (StDev) if number of observations used (n used) >=6 (blue background). Classical statistics was employed if number of observations used (n used) < 6 (no color background). %RSD is the relative standard deviation with respect to the mean (StDev/Mean x 100). Uncertainty (Uncert.) is a measure to estimate where the true mean lies.

**2. Thompson-Horwitz %RSD and IA %RSD:** These are benchmark values that can be used to compare to actual variability of Lab Values (Robust %RSD). Thompson-Horwitz %RSD is a benchmark on variability from proficiency testing programs. IA %RSD is variability expected from AAPFCO investigational allowance (IA).

**3. Precision Parameters:** Lab's precision is estimated by the difference in 2 results reported by the lab (range). Mean of ranges are shown for number of observations used (n used). Analyte All Tests report identifies data not used. Robust statistics was employed to determine mean if number of observations used (n used) >=6 (green background). Classical statistics was employed if number of observations used (n used) <6 (no color background).

# Appendix

## Content Description of Analyte Summary Statistics Report

The Analyte Summary Statistics Report provides trueness and precision parameters from determination of an analyte regardless of method. Determination of summary statistics followed protocols in ISO 13528:2015(E) using Algorithm A robust analysis (Statistical methods for use in proficiency testing by interlaboratory comparison). Robust statistics was used to determine statistical parameters for sets with 6 or more observations. Classical statistics was used for sets with 3, 4, or 5 observations. Robust statistics has an advantage of removing undesired influence of outlying data on the mean and standard deviation without removing data from the statistical analysis.

For trueness, the mean and standard deviation (StDev) are presented for the number of observations (n used). The uncertainty (Uncert.) is a measure of where the "real" value for the concentration lies around the mean with a 68% certainty (Mean ± Uncert.). The larger the number of observations, the smaller the uncertainty. The relative standard deviation (%RSD) is a percentage of the standard deviation divided by the mean. Standard deviation from Lab Values is determined by robust statistics for n used >=6 or classical statistics for n used <6. The Thompson-Horwitz %RSD is a standard benchmark on inter-laboratory variability (Thompson, DOI: 10.1039/b000282h) that can be used to compare %RSD from Lab Values variability with Thompson-Horwitz expectation. The IA %RSD is a measure of variability expected from the AAPFCO investigational allowance (IA) where standard deviation is IA/2.33.

Precision in the data populations is estimated by the range of duplicate results reported. The robust or classical mean is presented along with the number of observations used. Any duplicate results that are exactly the same are removed in the determination of the mean range to remove undo influence of entries that may be from labs reporting one result twice.

# Magruder Fertilizer Proficiency Testing

## ANALYTE All Labs Report

## 260841 (0-45-0)



**Issue Date: 10/31/2026**

| Code | Analyte | Method | Lab Code | Result1 | Result2 | [1] Lab Value | [2] Z score | [3] Robust Stats Mean | StDev | n used | [4] Flag |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | **Total N (%)** | | | | | | | |
| 010.60 | Total N (%) | Combustion | **0527** | 0.258 | 0.246 | **0.252** | | | | | |
| | | | | **Total P2O5 (%)** | | | | | | | |
| 020.40 | Total P2O5 (%) | Automated | **0042** | 45.44 | 44.2 | **44.82** | **-1.84** | 47.37 | 1.384 | 9 | |
| 020.50 | Total P2O5 (%) | ICP | **0368** | 45.9796 | 44.7856 | **45.38** | **-1.44** | 47.37 | 1.384 | 9 | |
| 020.20 | Total P2O5 (%) | Spectrophotometric | **0309** | 46.8 | 47.15 | **46.98** | **-0.29** | 47.37 | 1.384 | 9 | |
| 020.20 | Total P2O5 (%) | Spectrophotometric | **0615** | 47.6 | 47.9 | **47.75** | **0.27** | 47.37 | 1.384 | 9 | |
| 020.50 | Total P2O5 (%) | ICP | **0527** | 47.9384 | 48.2611 | **48.1** | **0.53** | 47.37 | 1.384 | 9 | |
| 020.99 | Total P2O5 (%) | Other | **0513** | 48.15 | 48.21 | **48.18** | **0.58** | 47.37 | 1.384 | 9 | |
| 020.99 | Total P2O5 (%) | Other | **0517** | 48.17 | 48.2 | **48.18** | **0.59** | 47.37 | 1.384 | 9 | |
| 020.20 | Total P2O5 (%) | Spectrophotometric | **0220** | 48.4 | 48.07 | **48.24** | **0.62** | 47.37 | 1.384 | 9 | |
| 020.20 | Total P2O5 (%) | Spectrophotometric | **0581** | 48.14 | 48.34 | **48.24** | **0.63** | 47.37 | 1.384 | 9 | |
| | | | | **Citrate Insoluble P2O5 (%)** | | | | | | | |
| 030.20 | Citrate Insoluble P2O5 (%) | Spectrophotometric | **0220** | 0.45 | 0.44 | **0.445** | | | | | |
| 030.50 | Citrate Insoluble P2O5 (%) | ICP, test portion 963.03 A-B | **0581** | 0.99 | 1 | **0.995** | | | | | |

| Code | Analyte | Method | Lab Code | Result1 | Result2 | [1] Lab Value | [2] Z score | [3] Robust Stats Mean | StDev | n used | [4] Flag |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Indirect Available P2O5 (45 %)** | | | | | | | | | | | |
| 040.50 | Indirect Available P2O5 (%) | ICP | 0547 | 46.3 | 46.5 | 46.4 | | | | | |
| 040.99 | Indirect Available P2O5 (%) | Other | 0220 | 47.95 | 47.63 | 47.79 | | | | | |
| **Direct Available P2O5 (45 %)** | | | | | | | | | | | |
| 041.50 | Direct Available P2O5 (%) | ICP | 0624 | 39.3 | 40.66 | 39.98 † | -3.59 | 45.9 | 1.648 | 8 | |
| 041.50 | Direct Available P2O5 (%) | ICP | 0007 | 45.3 | 44.7 | 45 | -0.54 | 45.9 | 1.648 | 8 | |
| 041.50 | Direct Available P2O5 (%) | ICP | 0368 | 45.9796 | 44.7856 | 45.38 | -0.31 | 45.9 | 1.648 | 8 | |
| 041.11 | Direct Available P2O5 (%) | Gravimetric Quinolinium, Citrate- | 0405 | 45.56 | 45.52 | 45.54 | -0.22 | 45.9 | 1.648 | 8 | |
| 041.11 | Direct Available P2O5 (%) | Gravimetric Quinolinium, Citrate- | 0220 | 45.74 | 45.85 | 45.8 | -0.06 | 45.9 | 1.648 | 8 | |
| 041.51 | Direct Available P2O5 (%) | ICP, Citrate-EDTA Ext. | 0494 | 46.68 | 46.58 | 46.63 | 0.44 | 45.9 | 1.648 | 8 | |
| 041.10 | Direct Available P2O5 (%) | Gravimetric Quinolinium | 0040 | 47.6 | 46.9 | 47.25 ‡ | 0.82 | 45.9 | 1.648 | 8 | |
| 041.11 | Direct Available P2O5 (%) | Gravimetric Quinolinium, Citrate- | 0513 | 48.19 | 48.12 | 48.16 ‡ | 1.37 | 45.9 | 1.648 | 8 | |
| **Water Soluble P2O5 (%)** | | | | | | | | | | | |
| 048.99 | Water Soluble P2O5 (%) | Other | 0513 | 42.23 | 42.13 | 42.18 | | | | | |
| 048.20 | Water Soluble P2O5 (%) | Spectrophotometric | 0581 | 47.15 | 47.34 | 47.24 | | | | | |
| **Soluble K2O (%)** | | | | | | | | | | | |
| 050.99 | Soluble K2O (%) | Other | 0527 | 0.2108 | 0.2119 | 0.2114 | | | | | |
| **Water (Free) (%)** | | | | | | | | | | | |
| 060.99 | Water (Free) (%) | Other | 0517 | 2.11 | 2.13 | 2.12 | | | | | |
| 060.99 | Water (Free) (%) | Other | 0513 | 2.16 | 2.17 | 2.165 | | | | | |

| Code | Analyte | Method | Lab Code | Result1 | Result2 | [1] Lab Value | [2] Z score | [3] Robust Stats Mean | StDev | n used | [4] Flag |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Acid Soluble Ca (%)** | | | | | | | | | | | |
| 101.33 | Acid Soluble Ca (%) | ICP, 2017.02 | **0624** | 14.82 | 14.78 | **14.8** | -0.73 | 17.11 | 3.162 | 4 | |
| 101.70 | Acid Soluble Ca (%) | Titrimetric | **0513** | 15.82 | 15.65 | **15.74** | -0.43 | 17.11 | 3.162 | 4 | |
| 101.33 | Acid Soluble Ca (%) | ICP, 2017.02 | **0527** | 16.1284 | 16.0924 | **16.11** | -0.31 | 17.11 | 3.162 | 4 | |
| 101.32 | Acid Soluble Ca (%) | ICP, test portion 2006.03A-C | **0581** | 21.77 | 21.78 | **21.78** | 1.48 | 17.11 | 3.162 | 4 | |
| **Acid Soluble Mg (%)** | | | | | | | | | | | |
| 121.33 | Acid Soluble Mg (%) | ICP, 2017.02 | **0624** | 0.29 | 0.3 | **0.295** | -0.92 | 0.4603 | 0.1795 | 4 | |
| 121.33 | Acid Soluble Mg (%) | ICP, 2017.02 | **0527** | 0.3935 | 0.408 | **0.4008** | -0.33 | 0.4603 | 0.1795 | 4 | |
| 121.30 | Acid Soluble Mg (%) | ICP, test portion inorganic 965.09 | **0513** | 0.433 | 0.428 | **0.4305** | -0.17 | 0.4603 | 0.1795 | 4 | |
| 121.30 | Acid Soluble Mg (%) | ICP, test portion inorganic 965.09 | **0581** | 0.7 | 0.73 | **0.715** | 1.42 | 0.4603 | 0.1795 | 4 | |
| **Total S (%)** | | | | | | | | | | | |
| 148.07 | Total S (%) | ICP, test portion as in 2017.02 | **0527** | <0.1 | <0.1 | **<0.1** | | | | | 6 |
| 148.07 | Total S (%) | ICP, test portion as in 2017.02 | **0624** | 1.36 | 1.35 | **1.355** | | | | | |
| **Acid Soluble As (ppm)** | | | | | | | | | | | |
| 151.34 | Acid Soluble As (ppm) | ICP, EPA 3050B/6010C | **0368** | 9 | 4.8 | **6.9** | -4.60 | 18.12 | 2.441 | 6 | 1 |
| 151.30 | Acid Soluble As (ppm) | ICP | **0513** | 15.63 | 15.92 | **15.78** | -0.96 | 18.12 | 2.441 | 6 | |
| 151.99 | Acid Soluble As (ppm) | Other | **0220** | 16.6 | 16.7 | **16.65** | -0.60 | 18.12 | 2.441 | 6 | |
| 151.32 | Acid Soluble As (ppm) | ICP, 2006.03 | **0220** | 17 | 17 | **17** | -0.46 | 18.12 | 2.441 | 6 | 7 |
| 151.33 | Acid Soluble As (ppm) | ICP, 2017.02 | **0494** | 18.2 | 19.2 | **18.7** | 0.24 | 18.12 | 2.441 | 6 | |
| 151.33 | Acid Soluble As (ppm) | ICP, 2017.02 | **0527** | 18.2188 | 19.429 | **18.82** | 0.29 | 18.12 | 2.441 | 6 | |
| 151.32 | Acid Soluble As (ppm) | ICP, 2006.03 | **0405** | 23 | 23 | **23** | 2.00 | 18.12 | 2.441 | 6 | 7 |

| Code | Analyte | Method | Lab Code | Result1 | Result2 | [1] Lab Value | [2] Z score | [3] Robust Stats Mean | StDev | n used | [4] Flag |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Acid Soluble B (%)** | | | | | | | | | | | |
| 165.99 | Acid Soluble B (%) | Other | **0527** | <0.01 | <0.01 | **<0.01** | | | | | 6 |
| **Acid Soluble Cd (ppm)** | | | | | | | | | | | |
| 181.30 | Acid Soluble Cd (ppm) | ICP | **0513** | 16.1 | 15.99 | **16.04** | **-1.96** | 20.78 | 2.414 | 7 | |
| 181.34 | Acid Soluble Cd (ppm) | ICP, EPA 3050B/6010C | **0368** | 18.7 | 19.4 | **19.05** | **-0.72** | 20.78 | 2.414 | 7 | |
| 181.32 | Acid Soluble Cd (ppm) | ICP, 2006.03 | **0220** | 20.4 | 20.8 | **20.6** | **-0.07** | 20.78 | 2.414 | 7 | |
| 181.99 | Acid Soluble Cd (ppm) | Other | **0220** | 20.7 | 21 | **20.85** | **0.03** | 20.78 | 2.414 | 7 | |
| 181.32 | Acid Soluble Cd (ppm) | ICP, 2006.03 | **0405** | 22 | 22 | **22** | **0.51** | 20.78 | 2.414 | 7 | 7 |
| 181.33 | Acid Soluble Cd (ppm) | ICP, 2017.02 | **0494** | 22.5 | 22.2 | **22.35** | **0.65** | 20.78 | 2.414 | 7 | |
| 181.33 | Acid Soluble Cd (ppm) | ICP, 2017.02 | **0527** | 22.9868 | 23.8963 | **23.44** | **1.10** | 20.78 | 2.414 | 7 | |
| **Acid Soluble Cr (ppm)** | | | | | | | | | | | |
| 191.34 | Acid Soluble Cr (ppm) | ICP, EPA 3050B/6010C | **0368** | 179 | 183 | **181** | **-1.36** | 214.5 | 24.7 | 7 | |
| 191.99 | Acid Soluble Cr (ppm) | Other | **0220** | 197 | 197 | **197** | **-0.71** | 214.5 | 24.7 | 7 | 7 |
| 191.32 | Acid Soluble Cr (ppm) | ICP, 2006.03 | **0220** | 198 | 200 | **199** | **-0.63** | 214.5 | 24.7 | 7 | |
| 191.33 | Acid Soluble Cr (ppm) | ICP, 2017.02 | **0494** | 229 | 223 | **226** | **0.47** | 214.5 | 24.7 | 7 | |
| 191.32 | Acid Soluble Cr (ppm) | ICP, 2006.03 | **0405** | 230 | 226 | **228** | **0.55** | 214.5 | 24.7 | 7 | |
| 191.30 | Acid Soluble Cr (ppm) | ICP | **0513** | 232.74 | 236.46 | **234.6** | **0.81** | 214.5 | 24.7 | 7 | |
| 191.33 | Acid Soluble Cr (ppm) | ICP, 2017.02 | **0527** | 237.371 | 234.467 | **235.9** | **0.87** | 214.5 | 24.7 | 7 | |
| **Acid Soluble Co (ppm)** | | | | | | | | | | | |
| 202.34 | Acid Soluble Co (ppm) | ICP, EPA 3050B/6010C | **0368** | <0.1 | <0.1 | **<0.1** | | 1.844 | 1.003 | 4 | 6 |
| 202.30 | Acid Soluble Co (ppm) | ICP | **0513** | 0.556 | 0.546 | **0.551** | **-1.29** | 1.844 | 1.003 | 4 | |
| 202.99 | Acid Soluble Co (ppm) | Other | **0220** | 1.85 | 1.9 | **1.875** | **0.03** | 1.844 | 1.003 | 4 | |
| 202.32 | Acid Soluble Co (ppm) | ICP, 2006.03 | **0220** | 1.95 | 1.95 | **1.95** | **0.11** | 1.844 | 1.003 | 4 | 7 |

| Code | Analyte | Method | Lab Code | Result1 | Result2 | [1] Lab Value | [2] Z score | [3] Robust Stats Mean | StDev | n used | [4] Flag |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 202.33 | Acid Soluble Co (ppm) | ICP, 2017.02 | **0527** | 2.4518 | 2.1048 | **2.278** | **0.43** | 1.844 | 1.003 | 4 | 1 |
| 202.32 | Acid Soluble Co (ppm) | ICP, 2006.03 | **0405** | 3 | 3 | **3** | **1.15** | 1.844 | 1.003 | 4 | 7 |
| | | | | | | **Acid Soluble Cu (%)** | | | | | |
| 221.00 | Acid Soluble Cu (%) | AA, inorganic 965.09 | **0513** | 0.0042 | 0.0042 | **0.0042** | **-1.38** | 0.0048 | 0.0004 | 6 | 7 |
| 221.32 | Acid Soluble Cu (%) | ICP, test portion 2006.03A-C | **0405** | 0.0047 | 0.0046 | **0.0046** | **-0.30** | 0.0048 | 0.0004 | 6 | |
| 221.32 | Acid Soluble Cu (%) | ICP, test portion 2006.03A-C | **0220** | 0.0047 | 0.0047 | **0.0047** | **-0.18** | 0.0048 | 0.0004 | 6 | 7 |
| 221.99 | Acid Soluble Cu (%) | Other | **0368** | 0.0049 | 0.0047 | **0.0048** | **0.06** | 0.0048 | 0.0004 | 6 | |
| 221.99 | Acid Soluble Cu (%) | Other | **0220** | 0.0046 | 0.0054 | **0.005** | **0.54** | 0.0048 | 0.0004 | 6 | |
| 221.33 | Acid Soluble Cu (%) | ICP, 2017.02 | **0527** | 0.0052 | 0.0054 | **0.0053** | **1.26** | 0.0048 | 0.0004 | 6 | |
| | | | | | | **Acid Soluble Fe (%)** | | | | | |
| 241.33 | Acid Soluble Fe (%) | ICP, 2017.02 | **0527** | 0.539 | 0.5468 | **0.5429** | | | | | |
| 241.32 | Acid Soluble Fe (%) | ICP, test portion 2006.03A-C | **0581** | 0.75 | 0.76 | **0.755** | | | | | |
| | | | | | | **Acid Soluble Pb (ppm)** | | | | | |
| 251.30 | Acid Soluble Pb (ppm) | ICP | **0513** | 1.936 | 1.981 | **1.958** | **-0.51** | 2.86 | 1.76 | 5 | |
| 251.99 | Acid Soluble Pb (ppm) | Other | **0220** | 2 | 2 | **2** | **-0.49** | 2.86 | 1.76 | 5 | 7 |
| 251.32 | Acid Soluble Pb (ppm) | ICP, 2006.03 | **0220** | 2 | 2.1 | **2.05** | **-0.46** | 2.86 | 1.76 | 5 | |
| 251.33 | Acid Soluble Pb (ppm) | ICP, 2017.02 | **0527** | 2.227 | 2.3583 | **2.293** | **-0.32** | 2.86 | 1.76 | 5 | |
| 251.32 | Acid Soluble Pb (ppm) | ICP, 2006.03 | **0405** | 6 | 6 | **6** | **1.78** | 2.86 | 1.76 | 5 | 7 |
| 251.34 | Acid Soluble Pb (ppm) | ICP, EPA 3050B/6010C | **0368** | 12.9 | 14.3 | **13.6** | **6.10** | 2.86 | 1.76 | 5 | 1 |
| | | | | | | **Acid Soluble Mn (%)** | | | | | |
| 261.35 | Acid Soluble Mn (%) | ICP, 2017.02 | **0527** | 0.0184 | 0.0182 | **0.0183** | | | | | |

| Code | Analyte | Method | Lab Code | Result1 | Result2 | [1] Lab Value | [2] Z score | [3] Robust Stats Mean | StDev | n used | [4] Flag |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Acid Soluble Hg (ppm)** | | | | | | | | | | | |
| 281.30 | Acid Soluble Hg (ppm) | ICP | **0527** | <0.001 | <0.001 | **<0.001** | | | | | 6 |
| 281.30 | Acid Soluble Hg (ppm) | ICP | **0405** | <2 | <2 | **<2** | | | | | 6 |
| 281.99 | Acid Soluble Hg (ppm) | Other | **0220** | 0.02 | 0.02 | **0.02** | | | | | 7 |
| **Acid Soluble Mo (ppm)** | | | | | | | | | | | |
| 289.30 | Acid Soluble Mo (ppm) | ICP | **0513** | 5.789 | 5.555 | **5.672** | **-0.99** | 6.605 | 0.9387 | 6 | |
| 289.34 | Acid Soluble Mo (ppm) | ICP, EPA 3050B/6010C | **0368** | 6.2 | 6.1 | **6.15** | **-0.48** | 6.605 | 0.9387 | 6 | |
| 289.99 | Acid Soluble Mo (ppm) | Other | **0220** | 6.2 | 6.3 | **6.25** | **-0.38** | 6.605 | 0.9387 | 6 | |
| 289.32 | Acid Soluble Mo (ppm) | ICP, 2006.03 | **0220** | 6.4 | 6.5 | **6.45** | **-0.17** | 6.605 | 0.9387 | 6 | |
| 289.33 | Acid Soluble Mo (ppm) | ICP, 2017.02 | **0527** | 7.0897 | 7.1259 | **7.108** | **0.54** | 6.605 | 0.9387 | 6 | |
| 289.32 | Acid Soluble Mo (ppm) | ICP, 2006.03 | **0405** | 8 | 8 | **8** | **1.49** | 6.605 | 0.9387 | 6 | 7 |
| **Acid Soluble Ni (ppm)** | | | | | | | | | | | |
| 291.30 | Acid Soluble Ni (ppm) | ICP | **0513** | 29.65 | 29.35 | **29.5** | **-1.09** | 35.48 | 5.495 | 5 | |
| 291.34 | Acid Soluble Ni (ppm) | ICP, EPA 3050B/6010C | **0368** | 31.7 | 32.3 | **32** | **-0.63** | 35.48 | 5.495 | 5 | |
| 291.99 | Acid Soluble Ni (ppm) | Other | **0220** | 36 | 35.6 | **35.8** | **0.06** | 35.48 | 5.495 | 5 | |
| 291.32 | Acid Soluble Ni (ppm) | ICP, 2006.03 | **0220** | 35.9 | 36.3 | **36.1** | **0.11** | 35.48 | 5.495 | 5 | |
| 291.33 | Acid Soluble Ni (ppm) | ICP, 2017.02 | **0527** | 44.0052 | 43.9747 | **43.99** | **1.55** | 35.48 | 5.495 | 5 | |
| 291.32 | Acid Soluble Ni (ppm) | ICP, 2006.03 | **0405** | 43 | 46 | **44.5** | **1.64** | 35.48 | 5.495 | 5 | 1 |
| **Acid Soluble Se (ppm)** | | | | | | | | | | | |
| 301.33 | Acid Soluble Se (ppm) | ICP, 2017.02 | **0527** | <0.01 | <0.01 | **<0.01** | | 6.12 | 5.584 | 6 | 6 |
| 301.30 | Acid Soluble Se (ppm) | ICP | **0513** | 2.149 | 2.159 | **2.154** | **-0.71** | 6.12 | 5.584 | 6 | |
| 301.32 | Acid Soluble Se (ppm) | ICP, 2006.03 | **0220** | 3 | 3.2 | **3.1** | **-0.54** | 6.12 | 5.584 | 6 | |
| 301.99 | Acid Soluble Se (ppm) | Other | **0220** | 3.3 | 3.1 | **3.2** | **-0.52** | 6.12 | 5.584 | 6 | |

| Code | Analyte | Method | Lab Code | Result1 | Result2 | [1] Lab Value | [2] Z score | [3] Robust Stats Mean | StDev | n used | [4] Flag |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 301.33 | Acid Soluble Se (ppm) | ICP, 2017.02 | **0494** | 3.73 | 3.7 | **3.715** | **-0.43** | 6.12 | 5.584 | 6 | |
| 301.32 | Acid Soluble Se (ppm) | ICP, 2006.03 | **0405** | 11 | 10 | **10.5** | **0.78** | 6.12 | 5.584 | 6 | |
| 301.34 | Acid Soluble Se (ppm) | ICP, EPA 3050B/6010C | **0368** | 13.1 | 15 | **14.05** | **1.42** | 6.12 | 5.584 | 6 | |
| **Sodium (%)** | | | | | | | | | | | |
| 311.33 | Sodium (%) | ICP, test portion as in 2017.02 | **0624** | 0.41 | 0.39 | **0.4** | | | | | |
| 311.33 | Sodium (%) | ICP, test portion as in 2017.02 | **0527** | 0.4502 | 0.4438 | **0.447** | | | | | |
| **Acid Soluble Zn (%)** | | | | | | | | | | | |
| 321.99 | Acid Soluble Zn (%) | Other | **0368** | 0.0363 | 0.0369 | **0.0366** | **-1.21** | 0.0429 | 0.0052 | 6 | |
| 321.32 | Acid Soluble Zn (%) | ICP, test portion 2006.03A-C | **0220** | 0.0407 | 0.0402 | **0.0404** | **-0.47** | 0.0429 | 0.0052 | 6 | |
| 321.99 | Acid Soluble Zn (%) | Other | **0220** | 0.0406 | 0.041 | **0.0408** | **-0.40** | 0.0429 | 0.0052 | 6 | |
| 321.32 | Acid Soluble Zn (%) | ICP, test portion 2006.03A-C | **0405** | 0.044 | 0.0433 | **0.0436** | **0.15** | 0.0429 | 0.0052 | 6 | |
| 321.00 | Acid Soluble Zn (%) | AA, inorganic 965.09 | **0513** | 0.046 | 0.047 | **0.0465** | **0.70** | 0.0429 | 0.0052 | 6 | |
| 321.33 | Acid Soluble Zn (%) | ICP, 2017.02 | **0527** | 0.0491 | 0.0495 | **0.0493** | **1.24** | 0.0429 | 0.0052 | 6 | |
| **Water Soluble Zn (%)** | | | | | | | | | | | |
| 325.30 | Water Soluble Zn (%) | ICP | **0368** | 0.0363 | 0.0369 | **0.0366** | | | | | |

**1. Lab Value:** Lab Value is the average of 2 reported lab result. † or ‡ beside Lab Value denotes the value exceeds the investigational allowance (IA) around the analyte mean. † denotes value is less than IA and ‡ denotes value is greater than IA. This is noted for guaranteed analytes with number of observations used (n used) >= 6. Method code and analyte name are shown in green for guaranteed analytes along with guaranteed concentration.

**2. Z score:** Red = Z value >3 or <-3 (action required), Orange = Z value between 2 and 3 or -2 and -3 (warning), Green = Z value between -2 and 2 (pass). Z values are shown for data sets with number of observation used (n used) >= 3 for Lab Values that are not an analytical limit or 0. Color ratings shown for number of observations used (n used) >= 6. Z values were calculated as (Lab Value - Mean)/(Standard Deviation (StDev)).

**3. Statistical parameters:** Robust statistics was employed to determine mean and standard deviation (StDev) if number of observations used (n used) >=6 (blue background). Classical statistics was employed if number of observations used (n used) = 3, 4, or 5 (pink background). Flags identify data not used to calculate mean and standard deviation.

**4. Flag:** Flag number identifies why data was not used to determine statistical parameters. 1 = data rejected for dups too far apart, 2 = rejected as extreme outier, 3 = rejected for both dups too far apart and extreme outlier, 4 = removed after manual inspection, 5 = rejected due to zero(s) submitted, 6 = rejected due to analytical limit submitted (eg "<0.1"), 7 = Lab's range rejected for determining mean range on Report Cards due to identical values reported for two results, 8 = Classical statistics used for standard deviation of data set since StDev < 0.0001 with robust statistics.

## Appendix

## Content Description of Analyte All Labs Report

The Analyte All Labs report has results listed for every lab grouped by Analyte with data in each group sorted by lab value. The reports are helpful to see where your lab result fell within the whole set of data for the Analyte by identifying your results by your lab code. Data on the right side of the report shows the mean, standard deviation, and number of observations (obs) used in the analysis of each group. An observation was a lab value for a test which was the average of reported duplicate results. Mean and standard deviation were determined using Algorithm A robust analysis in ISO 13528:2015(E) (Statistical methods for use in proficiency testing by interlaboratory comparison) for 6 or more observations. Robust statistics has an advantage of removing undesired influence of outlying data on the mean and standard deviation without removing data from the statistical analysis. Robust statistics was only used on data sets with 6 or more observations. For data sets with 3, 4, or 5 observations, classical calculation of mean and standard deviation was performed. Z scores for data sets with a small number of observations are given less importance as indicated by no color coding of Z score with less than 6 observations. No Z scores were determined for 1 or 2 observations.

Before determining mean and standard deviation for a set of data, data was removed from statistical analysis for various reasons. Mandel statistical analysis was used to identify and remove extreme outliers and lab values from duplicate results that were too far apart (ISO 5725-2:1994, Accuracy (trueness and precision) of measurement methods and results – Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method.). Any individual result report of zero or less than a limit resulted in lab value removed from analysis. The lab values removed from analysis are denoted with numerical flags on the far right-hand side of the report. Z scores are reported for data removed due to extreme outlier or duplicates too far apart even though data was not used in the determination of mean and standard deviation. However, Z scores are not reported for results reported as 0 or less than a limit. Also, any submission of just one lab result is removed for consideration in statistical analysis and presentation on reports.

The American Association of Plant Food Control Officials (AAPFCO) recommends limits around a nutrient guarantee that should initiate an investigation if observed nutrient concentration falls outside of the limits. These limits are referred to as Investigational Allowances (IAs). Lab Values that fall outside of the IA limits around the analyte mean are denoted with † (below limit) or ‡ (above limit). These same symbols are also used to denote Lab Values beyond IA limits on Laboratory Report Cards.